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EVALUATION OF EMULSIFIED ASPHALT PRIMER SUPPLIED BY NORJOHN CONTRACTING LTD

MATERIALS INFORMATION
ENGINEERING MATERIALS OFFICE

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

EVALUATION OF EMULSIFIED ASPHALT PRIMER SUPPLIED BY NORJOHN CONTRACTING LIMITED

by

R.C. Aquin, P. Korgemagi
D.F. Lynch

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INTRODUCTION

In 1985, Norjohn Contracting Ltd. of Niagara Falls, Ontario applied to the Bituminous Section of the Engineering Materials Office to have their new emulsified asphalt primer EP 3 approved. Approval requires that several test sections be installed adjacent to established products such as MTC Primer or RC-30. Norjohn Contracting Ltd. placed 9 test sections in the Niagara Falls area from August to September, 1985. This reports details the test sections and recommends that Norjohn's emulsified asphalt primer, EP 3, be accepted on the Ministry Designated Sources list.

GUIDELINES

Suppliers seeking approval for emulsified asphalt primers must demonstrate the performance of their new material by placing a minimum of six test sections adjacent to established primers such as MTC Primer or RC-30.

The test sections should meet the following requirements:

1) 300 m or greater in length.

2) MTC Primer or RC-30 must be placed in the same day adjacent to the new material.

3) The test sections should include base material from quarries and gravel pits.

4) The test sections must not be surface treated for at least one month for evaluation purposes.

TEST SECTIONS

Kalar Road

Kalar Road at Beaver Dam Road, in the City of Niagara Falls, was sprayed with the Norjohn emulsified asphalt primer, EP 3, on 85 08 02. The test section was 152 m in length. Kalar Road has the heaviest traffic count (1500 cars per

day) of all nine test sections. The base material was quarried limestone. The EP 3 application rate was 1.70 kg/m^2 and the cover aggregate was washed coarse manufactured sand. Norjohn's EP 3 penetrated ± 13 mm into the granular base. MTC primer was not applied on Kalar Road. After two months of service, the exposed EP 3 was in good condition. There were three small potholes. The test section was paved on 85 09 30 with open graded cold mix.

Crowland Avenue

Crowland Avenue at Carl Road, in the City of Niagara Falls, was sprayed with EP 3 in the northbound lane and with MTC Primer in the southbound lane on 85 09 20. The test section was 304 m in length. Crowland Avenue has a traffic count less than 150 cars per day. The quarried limestone base was well compacted with some loose float at the time of spraying. The EP 3 and the MTC Primer were both sprayed at 1.70 kg/m^2. Coarse washed manufactured sand was used as the cover aggregate. The penetration of the EP 3 was ± 10 mm into the granular base and ± 13 mm for the MTC Primer.

The exposed EP 3 and MTC Primer both were in good condition after six weeks of service. The streaking in the EP 3 which was evident after spraying had disappeared.

Yokom Road

Yokom Road at Crowland, in the City of Niagara Falls, was sprayed with EP 3 in the westbound lane and with MTC Primer in the eastbound lane on 85 09 20. The test section was 309 m in length. Yokom Road has a traffic count of 100 to 150 vehicles per day. The quarried limestone base was well compacted with a considerable amount of loose float. The float was clear stone about 19 mm in size. The application rate for both EP 3 and MTC Primer was increased to 2.05 kg/m^2 because of the excess loose float. Coarse washed manufactured sand was used to cover the primers. The EP 3 penetrated ± 10 mm and the MTC Primer penetrated ± 13 mm into the limestone base.

The exposed EP 3 and MTC Primer were both in good condition after six weeks of service,with very little difference in appearance between either material.

The poor grade preparation prior to spraying was beginning to show in the form of depressions. Each material had one small pothole in these depressions.

Sauer Road

Sauer Road, in the City of Niagara Falls, was sprayed with EP 3 in the westbound lane and with MTC Primer in the eastbound lane on 85 09 20. The length of the test section was 304 m. Sauer Road has a traffic count of 100 to 150 vehicles per day. The quarried limestone base was well compacted with very little loose float at the time of spraying. The EP 3 and the MTC Primer were sprayed at 1.70 kg/m^2. Coarse washed manufactured sand was applied over the primers as cover aggregate. Penetration of the EP 3 and the MTC Primer into the granular base was 6-10 mm.

After approximately six weeks of service, the exposed EP 3 and MTC Primer were in good condition. There were several areas with obvious grade problems as evidenced by severe depressions.

Ort Road

Ort Road, in the City of Niagara Falls, was also sprayed in 85 09 20 with EP 3 in the northbound lane and with MTC Primer in the southbound lane. The length of the test section was 304 m. Ort Road has a traffic count of 100 to 150 vehicles per day. The base material was quarried limestone which was well compacted, dry and dusty prior to spraying. Both the EP 3 and MTC Primer were applied at 1.70 kg/m^2. The cover aggregate was coarse washed manufactured sand. Both primers penetrated ± 6 mm into the granular base.

The exposed EP 3 was in good condition with no potholes, after approximately six weeks of service. The exposed MTC Primer was in good condition with one large section (6 m x 2 m wide) of break up which was due to base failure.

Weaver Road

Weaver Road in the City of Niagara Falls was sprayed on 85 09 20. EP 3 was sprayed in the westbound lane for 304 m. In the eastbound lane, MTC Primer was sprayed for 259 m, with EP 3 sprayed in the remaining 45 m. Weaver Road

has a traffic count of 100 to 150 vehicles per day. The base material was quarried limestone with considerable loose float on the surface prior to spraying. The application rate was 1.70 kg/m^2 for both materials. Coarse washed manufactured sand was applied as cover aggregate. Penetration into the granular base was ± 6 mm for both materials.

The exposed EP 3 and MTC Primer were both in good condition after 6 weeks of service.

Moore Drive

In the town of Pelham, Moore Drive from Effingham westerly 232 m was sprayed with EP 3 on 85 09 30. The MTC Primer was sprayed from the EP 3 westerly 223 m also on 85 09 30. Moore Drive is a narrow residential road with a low traffic count of 63 cars per day. The granular base material was from a gravel pit the material was damp and had just been graded about two hours prior to spraying, leaving approximately 19 mm of loose float on the road. The EP 3 was sprayed at 1.65 kg/m^2 and the MTC Primer at 1.70 kg/m^2. Coarse washed manufactured sand was applied over both materials. Penetration into the base material was 10-13 mm for the EP 3 and 13-16 mm for the MTC Primer.

After 4 weeks of service both the exposed EP 3 and the exposed MTC Primer were in good condition.

Overholt Road

Overholt Road at Hansler, in the Town of Pelham, was sprayed on 85 09 30 with EP 3 in the eastbound lane and with MTC Primer in the westbound lane. The length of the test section was 372 m. Overholt Road has a traffic count of 220 vehicles per day. The granular base material was from a gravel pit and was dry and dusty except on the hill. Calcium chloride had been applied earlier in the summer on the hill. There was approximately 10 mm of loose float on the level sections at the time of spraying. The EP 3 was sprayed at 1.55 kg/m^2 and the MTC Primer at 1.85 kg/m^2. Coarse washed manufactured sand was applied over both materials. There were streaks of gravel ± 6 mm wide not covered with EP 3 near the centreline of level section at the bottom on the hill. There were numerous small circles (6 mm) of gravel not covered with MTC

primer in the same area. Coarse washed manufactured sand was applied over both materials. Penetration into the granular base was ± 13 mm for both materials.

After 4 weeks of service the exposed materials were in good condition. There was no evidence of the streaking or the circles. There was one small pothole in the MTC Primer where damage by traffic occurred during construction.

Pihach Street

Pihach Street, in the Town of Pelham, was sprayed on 85 09 30 with EP 3 in the southbound lane and with MTC Primer in the northbound lane. The length of the test section was 335 m. Pihach Street is a residential road with a traffic count of 125 cars per day. The granular base material was from a gravel pit. There was approximately 6 mm of loose float on the road, and it appeared that calcium chloride had been applied earlier in the summer. The EP 3 and the MTC Primer were applied at 1.55 kg/m^2. There was slight streaking with the EP 3, however, the streaks began to disappear after 10 minutes. The MTC Primer did not streak. Coarse washed manufactured sand was applied over the primers. Both materials penetrated ± 10 mm into the granular base.

After 4 weeks of service, both the exposed EP 3 and the exposed MTC Primer were in good condition. The streaking with the EP 3 noted during construction was not visible.

OBSERVATION CONCLUSION AND RECOMMENDATION

Observation

At the time of inspection there was no difference in performance between the exposed Norjohn emulsified asphalt primer, EP 3, and the exposed MTC Primer.

Conclusion

The Norjohn emulsified asphalt primer, EP 3, is an acceptable primer.

Recommendation

Norjohn's emulsified asphalt primer, EP 3, should be added to the Ministry Designated Sources, DS: 148, Liquid Asphalt and Primers.

APPENDIX

NORJOHN EMULSIFIED ASPHALT PRIMER AND MTC PRIMER
TEST SECTIONS

Location	Norjohn Emulsified Asphalt Primer				MTC Primer			
	Date Constructed	Application Rate, kg/m^2	Penetration Into Base, mm	Rating[2]	Date Constructed	Application Rate, kg/m^2	Penetration Into Base, mm	Rating[2]
Kaler Rd.	85 08 02	1.70'	± 13	Good	--	--	--	--
Crowland Ave.	85 09 20	1.70'	± 10	Good	85 09 20	1.70'	± 13	Good
Yokom Rd.	85 09 20	2.05'	± 10	Good	85 09 20	2.05'	± 13	Good
Sauer Rd.	85 09 20	1.70'	6 - 10	Good	85 09 20	1.70'	6 - 10	Good
Ort Rd.	85 09 20	1.70'	± 6	Good	85 09 20	1.70'	± 6	Good
Weaver Rd.	85 09 20	1.70'	± 6	Good	85 09 20	1.70'	± 6	Good
Moore Dr.	85 09 30	1.65	10 - 13	Good	85 09 30	1.70	13 - 16	Good
Overhold Rd.	85 09 30	1.55	± 13	Good	85 09 30	1.85	± 13	Good
Pihach St.	85 09 30	1.55	± 10	Good	85 09 30	1.55	± 10	Good

Notes:

1. Obtained from Norjohn Contracting Ltd.
2. Rating as of 85 10 31

EMULSIFIED ASPHALT PRIMER

TEST DATA AND MANUFACTURERS' SPECIFICATIONS

Test	MTC Test Data	Manufacturers' Specifications					
	Norjohn EP 3	Norjohn EP 3		Chevron SP-6		McAsphalt Prem	
		Min.	Max.	Min.	Max.	Min.	Max.
Visc. at 50°C, SF.s	180.8	50	200	80	175	50	200
Residue by Distillation, by mass, %	55.1	45	-	40	-	40	-
Residue penetration at 25°C, 0.1 mm	197	100	400	100	200	80	200
Residue ductility at 25°C, cm	100+	-	-	100	-	100	-
Settlement, 5 days, %	N.V.S.[1]	N.V.S.[1]		N.V.S.[1]		N.V.S.[1]	
Flash point, (T.O.C.), °C	45+	-	-	45	-	-	-
Oil portion of distillate, by volume EAP, %	22.4	-	30	-	48	-	35

Note: 1. No visible separation.

MTC PRIMER

TEST DATA AND SPECIFICATIONS

Test	MTC Primer Test Data	OPSS 1102 Requirements Min.	Max.
Visc. at 60°C, mm^2/S	35.0	20	35
Distillate, % of total distillate to 360°C,			
to 190°C, %	60.6	20	80
to 225°C, %	77.5	40	-
to 360°C, %	88.8	70	-
to 316°C, %	95.6	85	-
Residue by volume, %	60.0	50	-
Residue penetration at 25°C, 0.1 mm	172	80	200
Residue ductility at 25°C, cm	100+	100	-

NORJOHN CONTRACTING LIMITED

PRODUCER SPECIFICATION

EMULSIFIED PRIME

REQUIREMENT	MIN.	MAX.	MTC TEST METHOD
Viscosity, Saybolt Furol @ 50°C	50	200	LS-219
Residue by Distillation % by Mass	45	---	* LS-216
Oil Portion % By Volume	--	30	* LS-217
Settlement 5 Day	No Visible Signs of Separation		
TESTS ON RESIDUE			
Penetration 100g., 5s, @ 25°C, dmm.	100	400	* LS-200
Solubility in Trichloroethylene	97.5	---	LS-204

* LS-216 Same as for Asphalt Emulsion except temperature to 360°C and remove immediately following same time span.

* LS-217 Oil Portion based on 210 rather than 200.

* LS-200 Residue to be poured into large Highfloat Type Pen Cans. Residue should be poured within 3 minutes of shutting off the flame.